

## The effect of giving palm sugar on the physical condition of football school students

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### ABSTRACT

**Problem:** The low achievement of students at the Football School (SSB) is thought to be due to unstable physical conditions, lack of energy sources consumed by players, lack of nutritional intake by players, and players still consuming a lot of cold drinks before and after training. **Objective:** This study aims to determine the effect of giving palm sugar on the physical condition of students at the Football School (SSB). **Method:** The type of research is an experiment with a one group pre-test and post-test research design. The population in this study was 204 people. The sample was 24 people with a sampling technique using purposive sampling technique. The instruments in this study were endurance tests with a 1000 meter running test, speed tests with a 30 meter running test, strength tests with a wall squat test, agility tests with an illionis test. The data analysis technique in this study used the t-test. **Results:** The results of statistical analysis showed a significant difference between the average initial test and the final endurance test ( $t_{count} = 8.980$ ), the average initial test and the final speed test ( $t_{count} = 6.965$ ), the average initial test and the final strength test ( $t_{count} = 8.112$ ), the average initial test and the final agility test ( $t_{count} = 9.070$ ) with a  $t_{table}$  value = 2.178. With a significance value (p-value) smaller than  $\alpha = 0.05$ , the null hypothesis ( $H_0$ ) is rejected and the alternative hypothesis ( $H_a$ ) is accepted, that there is a significant difference between the average initial test and the average final physical condition test. Conversion of the physical condition component value, it is known that the initial test result of 3.6 is in the *very poor category*, and the final test result of 6.4 is in the *sufficient category*. These results indicate that there is a significant increase after giving palm sugar to the physical condition. **Conclusion:** Based on the research results, it can be concluded that there is an effect of giving palm sugar on the physical condition of students at the Football School (SSB).

**Keywords:** palm sugar, physical condition, football.

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### Introduction

Sport is a human movement activity that requires certain techniques, so that in its implementation there is an element of play, a sense of pleasure, it is done in free time, and it is for one's own satisfaction. Based on the Law on Sports (2022) sports are all activities that involve the mind, body, and soul in an integrated and systematic manner to encourage, foster, and develop physical, spiritual, and social potential. Sports are divided into several parts, including; educational sports, achievement sports, traditional sports, health sports, and recreational sports. Achievement sports are sports that foster and develop athletes in a planned, systematic, integrated, hierarchical, and sustainable manner through competitions to achieve achievements with the support of sports science and technology (Law on Sports, 20224). There are many types of sports that are included in competitive sports, one of the most popular sports among the public today is football.

Football is a game played by two teams, each consisting of 11 players, commonly called a team. Each team tries to put the ball into the opponent's goal as much as possible and tries to defend its own goal, so that the opponent's ball does not enter, according to the *FIFA law of the game*. (Agustina, 2019). Football is a type of team game that embodies all the movements in it. The desire to win so that every spectator feels satisfied is always in every player. Such great passion, encouragement from coaches, management and

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every element in the match environment gives rise to a new style of athlete performance (Kumbara et al., 2019). Based on the expert opinion above, it can be concluded that football is a game played by two teams, each team consisting of 11 players. This game embodies all the movements in it. Each team tries to put the ball into the opponent's goal and tries to defend their own goal so that the opponent's ball does not enter. Football is played on a rectangular field with a length of 90m-120m with a width of 45m-90m and a goal length of 7.32m (8 yards) with a height of 2.44m (8 ft) (Agustina, 2019). To become a reliable soccer player, you must have prime physical condition.

Physical condition is the most important component in achieving achievements (Prima & Kartiko, 2021). Physical condition is one of the requirements needed for successful sports (Adnan & Amin, 2020). Physical condition is an important element and is the basis/foundation in developing techniques, tactics, strategies and mental development (Bafirman, 2018). According to Naewan (2021) Physical condition is the physical components of a person or athlete that can be developed and improved through regular and systematically programmed training. Physical condition is one of the requirements needed in an effort to improve athlete performance, it can even be said to be a basic need that cannot be postponed or negotiated (Ridwan, 2020). The role of physical condition in providing information and motivating athletes to continue to improve their physical condition abilities, so that training goals can be achieved properly (Wicaksana, 2021). Better physical condition has many benefits, including athletes being able and easily learning new skills that are relatively difficult, not getting tired easily in participating in training and matches, training programs can be completed without many obstacles, faster recovery time and being able to complete relatively heavy training (Bafirman, 2018). Physical condition is one of the requirements needed for high-achieving sports. Based on the expert statement above, physical condition is the state of body function in facing the physical demands of a sport to perform optimally and not easily become tired during training or competition. Perfect physical condition certainly requires good training and requires nutritional intake such as sports nutrition drinks consumed by athletes so that they can achieve prime physical condition. Sports nutrition drinks are products designed to meet the needs of fluids and nutrients that are lost quickly into the body during training or competition (Riyanto et al., 2016). Nutrients here include carbohydrates, fats, proteins, vitamins, minerals, and also water. Each of these nutrients has its own role (Supriyanto et al., 2022). One of the key factors in supporting an athlete's fitness level is meeting their energy needs. Food for athletes must contain nutrients that meet their daily activity and sports needs. Nutritional needs such as carbohydrates, protein, fat, fiber, fluids and micronutrient intake are important for maintaining health, adapting to training and increasing endurance during training sessions and competitions (Desiplia et al., 2018).

Palm sugar is one of the food intakes that can be used as a research, where there are many benefits produced, including as an iron binder to bind oxygen in the blood. Palm sugar is a type of brown sugar produced from the sugar palm tree (palm family) which has better quality than coconut sugar. Palm sugar is one of the processed foods sourced from the processing of sap water from the male flower bunches of the sugar palm tree. The processing of sap into palm sugar goes through a boiling process until the sap turns into a thick and dark colored liquid (Jarkasih & Fardi, 2020). The advantages of palm sugar in terms of nutritional content have protein, fat, potassium and phosphorus levels (Limbangan & Kendal, 2022). According to Jufri (2022) Palm sugar (*Arenga pinnata*) is a simple carbohydrate, so it can be used as an alternative to meet the energy intake needs of athletes before exercising. The public perception is that if you want to have good endurance during long-term activities, so that you don't get tired easily, you should consume palm sugar. Palm sugar is known by the Indonesian people as a sweetener for food and drinks that can be a substitute for granulated sugar (cane sugar).

Palm sugar is obtained from the process of tapping palm sap which is then reduced in water content until it becomes solid. Palm sugar products on the market can be found in the form of molded sugar and ant sugar. Molded sugar is obtained by cooking palm sap until it becomes thick and then molding it in a bamboo mold in the shape of a circle or bowl. Brown sugar from palm sap is superior to brown sugar from coconut sap. Palm sugar has a much sweeter and sharper taste. Therefore, the food industry that uses brown sugar prefers palm sugar (Jufri, 2022). Ant sugar or palm sugar and crystals/granules have advantages such as easy handling, use, packaging and storage and have a more complete nutritional content compared to granulated sugar (Sudadi et al., 2022). The nutritional content contained in palm sugar in the process of making palm sugar is generally more natural so that the substances contained in it are not damaged and remain intact, and do not require repeated refining processes or use additional ingredients to purify it (Jufri, 2022). Palm sugar also has the advantage that it does not dissolve directly in the body, but is absorbed slowly, therefore palm sugar can last a long time in the body. So it does not directly increase sugar levels in the body. Palm sugar is safe for consumption by diabetics (Ardiana, 2019). The function and benefits of brown sugar for body health are very important. Various contents in a food, for example, such as mineral

content, protein, vitamins and others, brown sugar content is one that is very much needed by the body which plays a very important role in maintaining body balance and keeping away various diseases (Ardiana, 2019). Based on the statement above, palm sugar contains carbohydrates, protein, fat, fluid, *zinc*, calcium, potassium, *polyphenols*, antioxidants, inulin and as an iron binder to bind oxygen in the blood, so it can be used as a source of nutrition during training sessions or competitions.

### Method

The method in this study is quantitative and qualitative with the type of experimental research. The design in this study is one group pre-test and post-test design. The population in this study were all students of the Bungo Regency Football School (SSB) as many as 204 people. The sample in this study was 24 people with the sampling technique being purposive sampling technique. Purposive sampling is a data source sampling technique with certain considerations (Sugiyono, 2023). The sample group was given treatment in the form of giving 80 grams of palm sugar with 250 ml of plain water solution and given 30 minutes before exercise (Alawi & Ray, 2021). Before and after the treatment was given, physical condition measurements were carried out consisting of four components, namely; endurance, speed, strength and agility. The physical condition instruments used in this study were endurance with a 1000-meter running test, speed with a 30-meter running test, strength with a wallsquat test, and agility with an illionis test. The data obtained were analyzed using the t-test to determine the difference in the average pretest and posttest in the sample group.

### Result

Based on the results of research on the components of physical condition consisting of endurance, speed, strength, and agility at the Football School (SSB), it can be described as follows:

#### 1. Endurance test result data

Table 1. Description of the frequency of endurance test results

Category	Value norms (minute)	Initial test			Final test		
		Value conversion	Frequency	Percentage	Value conversion	Frequency	Percentage
Perfect	<3.04	10	0	0.00%	10	0	0.00%
Very well	3.05-3.53	8	0	0.00%	8	0	0.00%
Enough	3.54-4.46	6	0	0.00%	6	6	46.15%
Not enough	4.47-6.04	4	7	53.85%	4	7	53.85%
Very less	>6.05	2	6	46.15%	2	0	0.00%
Total		40 40:10 =4	13	100%	64 64:10=6.4	13	100%

Based on the table above, it shows that the initial endurance test results were obtained from 13 people, of which no one was in the perfect category, no one was in the very good category, no one was in the sufficient category, 7 people (53.85%) ranged in value between (4.47-6.04) with the less category, and 6 people (46.15%) ranged in value (>6.05) in the very less category. Based on the sum of the initial endurance test value conversion and divided by the total number of physical condition components, it is known that the initial endurance test level of SSB Bungo Regency is in the *less category*. The final endurance test results were obtained from 13 people, of which no one was in the perfect category, no one was in the very good category, 6 people (46.15%) ranged in value (3.54-4.46) with the sufficient category, 7 players (53.85%) ranged in value (4.47-6.04) with the less category, and no one was in the very less category. Based on the addition of the final endurance test value conversion and divided by the total number of physical condition components, it is known that the final endurance test level of SSB Bungo Regency is in the *sufficient category*.

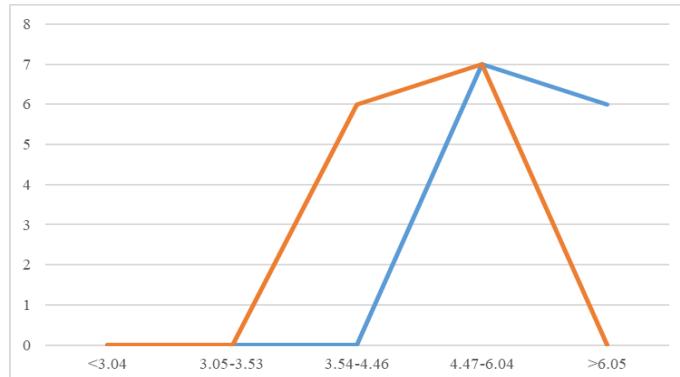


Figure 1. Description of the frequency of endurance test results

## 2. Speed test result data description

Table 2. Description of speed test result frequencies

Category	Value norm (seconds)	Initial test			Final test		
		Value conversion	Frequency	Percentage	Value conversion	Frequency	Percentage
Perfect	<4.0	10	0	0.00%	10	1	7.7%
Very well	4.0-4.2	8	0	0.00%	8	3	23.07%
Enough	4.3-4.4	6	0	0.00%	6	3	23.07%
Less	4.5-4.6	4	0	0.00%	4	0	0.00%
Very Less	>4.6	2	13	100%	2	6	46.16%
Total		26 26:10=2,6	13	100%	64 64:10=6,4	13	100%

Based on the table above, it shows that the initial speed test results were obtained from 13 people, where none were in the perfect category, none were in the very good category, none were in the sufficient category, none were in the less category and 13 people (100%) ranged in value (>4.6) with a very poor category. Based on the sum of the initial speed test value conversion and divided by the total number of physical condition components, it is known that the initial speed test level of SSB Bungo Regency is in the *very poor category*. The final speed test results were obtained from 13 people, where 1 person (7.7%) ranged between (<4.0) with a perfect category, 3 people (23.07%) ranged in value (4.0-4.2) with a very good category, 3 people (23.07%) ranged in value (4.3-4.4) with a sufficient category, none were in the less category, and 6 people (46.16%) ranged in value (>4.6) with a very poor category. Based on the addition of the final speed test value conversion and divided by the total number of physical condition components, it is known that the final speed test level of SSB Bungo Regency is in the *sufficient category*.

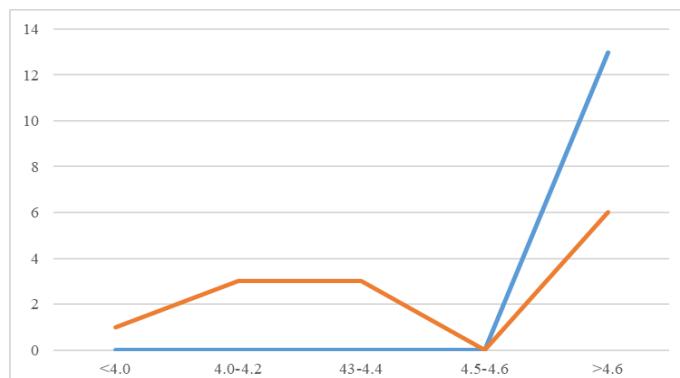


Figure 2. Description of speed test result frequencies

### 3. Strength test result data

Table 3. Description of the frequency of strength test results

Category	Value norm (seconds)	Initial test			Final test		
		Value conversion	Frequency	Percentage	Value conversion	Frequency	Percentage
Perfect	>102	10	1	7.7%	10	1	7.7%
Very well	76-102	8	0	0.00%	8	1	7.7%
Enough	58-75	6	1	7.7%	6	3	23.07%
Not enough	30-57	4	6	46.15%	4	7	53.84%
Very less	<30	2	5	38.46%	2	1	7.7%
Total		50 50:10=5	13	100%	66 66:10=6,6	13	100%

Based on the table above, it shows that the initial strength test results were obtained from 13 people, of which 1 person (7.7%) ranged from a value (>102) with a perfect category, no one was in the very good category, 1 person (7.7%) ranged from a value (58-75) with a sufficient category, 6 people (46.15%) ranged from a value (30-57) with a less category, and 5 people (38.46%) ranged from a value (<30) with a very less category. Based on the summation of the initial strength test value conversion and divided by the total number of physical condition components, it is known that the initial strength test level of SSB Bungo Regency is in the *less category*. The final strength test data results obtained from 13 people, of which 1 person (7.7%) ranged from (>102) with a perfect category, 1 person (7.7%) ranged from (76-102) with a very good category, 3 people (23.07%) ranged from (58-75) with a sufficient category, 7 people (53.84%) ranged from (30-57) with a less category, and 1 person (7.7%) ranged from (<30) with a very less category. Based on the sum of the final strength test value conversion and divided by the total number of physical condition components, it is known that the final strength test level of SSB Bungo Regency is in the sufficient *category*.

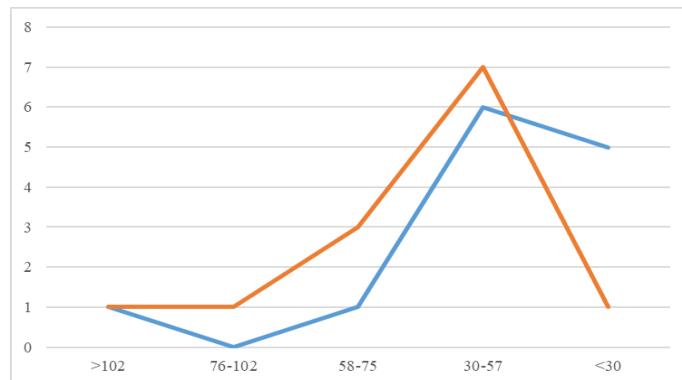


Figure 3. Description of the frequency of strength test results

### 4. Agility test result data

Table 4. Description of the frequency of agility test results

Category	Value norm (seconds)	Initial test			Final test		
		Value conversion	Frequency	Percentage	Value conversion	Frequency	Percentage
Perfect	<15.2	10	0	0.00%	10	1	7.7%
Very well	15.3-16.1	8	0	0.00%	8	2	15.38%
Enough	16.2-18.1	6	0	0.00%	6	8	61.54%
Less	18.2-19.3	4	2	15.38%	4	2	15.38%
Very Less	>19.3	2	11	84.61%	2	0	0.00%
Total		30 30:10=3	13	100%	82 82:10=8,2	13	100%

Based on the table above, it shows that the results of the initial test of agility were obtained from 13 people, of which no one was in the perfect category, no one was in the very good category, no one was in the adequate category, 11 people (84.61%) ranged in value ( $>19.3$ ) with the very low category, and 2 people (15.38%) ranged in value (18.2-19.3) with the low category. Based on the total conversion of the initial agility test value and divided by the total number of physical condition components, it is known that SSB Bungo Regency initial agility test level is in the *very low category*. The results of the final agility test data were obtained from 13 people, of which 1 person (7.7%) ranged in value ( $<15.2$ ) categorized as perfect, 2 people (15.38%) ranged in value (15.3-16.1) with the very good category, 8 people (61.54%) ranged in value (16.2-18.1) with the sufficient category, 2 people (15.38%) ranged in value (18.2-19.3) with the less category and no one in the very less category. Based on the total conversion of the final agility test value and divided by the total number of physical condition components, it is known that SSB Bungo Regency agility final test level is in the *very good category*.

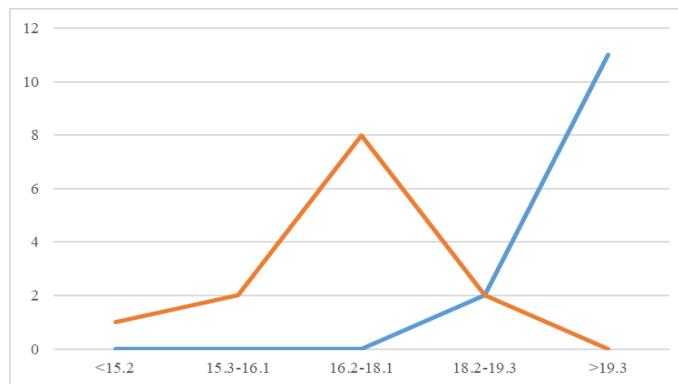


Figure 4. Description of the frequency of agility test results

##### 5. Description of physical condition test result data

Description of the test data results for physical condition components after conversion, for greater clarity can be seen in the table below:

Table 5. Conversion of physical condition test results

Physical condition components	Initial test score conversion	Final test score conversion
Durability	4	6.4
Speed	2.6	6.4
Strength	5	6.6
Agility	3	8.2
Amount	14.6	27.6

Table 6. Description of physical condition test result conversion

Category	Score Range	Initial test results	Final test results
Perfect	9.6-10		
Very well	8.0-9.5		
Enough	6.0-7.9	$14.6 : 4 = 3.6$	$27.6 : 4 = 6.9$
Not enough	4.0-5.9		
Very less	2.0-3.9		

Based on the results of the sum of the conversion values of all components of the initial physical condition test, with the results of the initial endurance test of 4, the initial speed test of 2.6, the initial strength test of 5, and the initial agility test of 3, then divided by the number of physical condition components studied with the result of 3.6 and notated in the physical condition status table, it is in the *very poor category*. Based on the results of the sum of the conversion values of all components of the final physical condition test with the results of the final endurance test of 6.4, the final speed test of 6.4, the final strength test of 6.6, and the final agility test of 8.2, then divided by the number of physical condition components studied with the result of 6.9 and notated in the physical condition status table, it is in the *sufficient category*.

## Discussion

Physical condition is a very important aspect to support an athlete's achievement, so the physical condition factor must be considered by athletes (Supriyoko & Mahardika, 2018). Physical condition is one factor that should not be ignored in soccer, because soccer is a sport that has high intensity. This physical condition is a basic foundation that must be met first from several stages of an athlete to achieve perfect training quality in achieving maximum performance when competing (Mansur et al., 2020). Physical condition is the ability to face the physical demands of a sport to perform optimally (Pratama & Umar, 2020). Perfect physical condition certainly requires increased good training and requires nutritional intake such as sports nutrition drinks consumed by athletes so that they can achieve prime physical condition. Sports nutrition drinks are products designed to meet the needs of fluids and nutrients that are lost quickly into the body during training or matches (Riyanto et al., 2016).

The results of the analysis conducted using the SPSS application, there is a statistically significant difference between the average initial test and final endurance test ( $t_{count} = 8.980, df = 12, p = 0.00 < t_{table} \text{ value} = 2.178$ ), the average initial test and final speed test ( $t_{count} = 6.965, df = 12, p = 0.00 < t_{table} \text{ value} = 2.178$ ), the average initial test and final strength test ( $t_{count} = 8.112, df = 12, p = 0.00 < t_{table} \text{ value} = 2.178$ ), the average initial test and final agility test ( $t_{count} = 9.070, df = 12, p = 0.00 < t_{table} \text{ value} = 2.178$ ). With a significance value (p-value) smaller than  $\alpha = 0.05$ , the null hypothesis ( $H_0$ ) is rejected and the alternative hypothesis ( $H_a$ ) is accepted, that there is a significant difference between the average initial test and the average final test of physical condition. These results indicate that there is a significant increase after the administration of palm sugar on the physical condition of SSB Bungo Regency.

If the administration of palm sugar is analyzed for physical conditions, palm sugar is given 30 minutes before exercise. Brown sugar has high levels of simple carbohydrates containing glucose, sucrose, fructose, thus brown sugar can be categorized as an energy producer in the body (Ramadhan & Avandi, 2020). Palm sugar theoretically contains a substance in the form of sucrose that will produce energy. Sucrose is a disaccharide formed from two monosaccharides, namely glucose and fructose. Sucrose will be broken down in the body assisted by enzymes that will produce glucose and fructose (Jarkasih & Fardi, 2020). Glucose is a simple sugar that will be used as energy that will be assisted by oxygen to reach the muscles and liver (Jarkasih & Fardi, 2020). When doing training activities, an athlete needs a lot of energy in the body, so the glucose produced by palm sugar is very helpful for an athlete when they need energy, so that when doing training players feel helped by the energy intake provided by palm sugar. Palm sugar contains natural compounds unlike ordinary sugar. Palm sugar contains compounds such as: vitamin B complex, glucose, mineral salts, and most importantly has a fairly high calorie content interspersed with the lowest sugar glycemic level of 35 gi (*Glycemic Index*) while in granulated sugar the glycemic index is 58. The glycemic index (*Glycemix Index*) is a scale or number given to certain foods based on how much the food increases blood sugar levels, the scale used is 0-100. The glycemic index is called low if it is on a scale of less than 50, the glycemic index, moderate if the value is 50-70 and the glycemic index is high if the number is above 70 (Heryani, 2016).

## Conclusion

Based on the results of the study on the physical condition components of SSB Bungo Regency, consisting of endurance, speed, strength, and agility, it is known that the final test scores of each component increased after being given palm sugar with a dose of 80 grams and dissolved in 250 ml of mineral water and given 30 minutes before training. The treatment was given 14 times, so that the final test score increased from the initial test score. The test results of each physical condition component were added up and divided by all physical condition components in the soccer sport. So that the level of physical condition of SSB Bungo Regency is known after the addition of the value conversion and divided by the number of physical condition components, it is known that the initial test result of 3.6 is in the *very poor category*, and the final test result of 6.4 is in the *sufficient category*. Based on the results of the study, it can be concluded that there is an effect of giving palm sugar on the physical condition of SSB Bungo Regency.

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